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Pre-service Class Teachers' Feelings about Graphs

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Abstract

Nowadays, reading and understanding the data is one of basic indicators to becoming an active and thoughtful citizen. These skills, also defined as numerical literacy, contribute meaningful and permanent learning via making connections between courses and subjects. In this view, Graphs are one of the forefront learning domains. Graphs are also frequently used in the education because of their ability to visualize numerical data. Whilst Graphs are considered a subject of mathematics, they are actually interdisciplinary subject and used in science, life and social studies and Turkish. The attitude of class teachers towards graphics is important as they are responsible to teach these courses in the first four grades. In the literature, although there are some studies on the knowledge levels of pre-service class teachers, there is a gap, especially in national literature, on the attitudes of them towards graphs. Being a part of study on developing an attitude instrument, this study aims at determining of the feelings of pre-service class teachers about graphs. For these purposes, 160 pre-service class teachers in fourth grade enrolled in a national university were asked an open ended question of "What do you feel when you face with a graph?" Data were collected in the second semester of instructional year of 2012-2013. Most of the pre-service class teachers feel that graphs will increase their undestanding and interpreting ability and they feel the necesssity of interpreting the graphs when they face with.

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1. Introduction

A graph contributes permanent and meaningful learning as making connections between subjects. In the democratic and globalizing word, in order to be an active, thoughtful and informed person, it is necessary to have

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ability of interpreting and questioning graphs and charts (Crowe, 2010). School has an important role to teach graphing and interpret graph to citizens (Monteiro & Ainley, 2002). So, teachers play fundamental role in teaching graphs as a skill and graphs should be thought making connections with social sciences (Duplass, 1996).

According to Baykul (2006), "*graph is one of the methods applied to improve understanding and summarizing the data, and they appeal to eye, which make understanding much easier and effective to highlight the significant points*". Graph is one of the mathematical representations frequently used in all mathematics curriculum even from elementary school to university level (Bayazit, 2011). Graphing can be seen as one of the critical movements in earlier mathematics (Leinhardt, Zaslavsky & Stein, 1990).Although graphics seem to be a subject of mathematics, it is an interdisciplinary subject of many areas, such as, science, social sciences and etc. Graphs and tables is a key and important subject to make connections between social studies and mathematics in elementary social studies and mathematics curriculum (Sahinkaya & Aladag, 2009). Pre-service teachers pointed that graph is a helpful subject to make connections between mathematics and social studies (Aladag & Sahinkaya, 2013).

Research studies show that teachers and pre-service teachers have graphing difficulties in understanding the relationships between the variables in the graphical context (Bayazıt, 2011), limited knowledge of some graphs (Alacaci, Lewis, O'Brien & Jiang, 2011; Sahinkaya & Aladag, 2013), and failure to distinguish a bar graph from histogram (Roth, McGinn & Bowen, 1998). Mumba et.al. (2009) claimed that the willingness of pre-service elementary teachers' about learning graphing more may depend on their attitude towards graphs. Their negative attitudes can affect their appreciation of the value of graphs professionally, personally and for their students negatively. In this study, our main purpose is to develop an attitude instrument towards graphs for pre-service class teachers in Turkish. This study is a preliminary study. Firstly, the feelings of pre-service class teachers about graphs were determined to obtain items related with attitudes. So, our research problem is "What do pre-service teachers feel when they face with a graph?"

2. Method

Study group of this work, which is a descriptive survey model, is 160 4th grade students having education in the 2012-2013 school years in a class teacher department of education faculty in a state university. 65% of study group is female, % 35 is male and 40.6%is graduated from Anatolian high school. A questionnaire consisting of one open ended question, which is determined by the researchers of this study based on literature survey, was used as a data collection tool. The question aimed at assessing the feeling of pre-service class teachers about graphs. The questionnaire was finalized after taking the suggestions of experts. The data obtained were analyzed by using descriptive analyses method. The researchers analyzed the student's answers independently and then they checked the similarities of the analyses. In order to test the reliability, all the points given by the researchers were analyzed using the formula reliability= agreement/(agreement+disagreement)x100 (Miles & Huberman, 1994). The agreement between the two researchers was calculated as 95%.

3. Findings

The categories and frequencies of pre-service class teachers answers to the question "What do you feel when you face with graphs?" are given at Table 1.

Table 1. The categories and frequencies of pre-service class teachers answers to the question "What do you feel when you face with graphs?"

Categories	f
1.Easiness	49
2. Need for explicating	34
3. Happiness, enjoying, sympathy	24
4. Interest	12
5. Comparing	11
6.Anxious and Worry	10
7.Enjoyment	9
8. Comfort	8
9.Curiosity	8
10.Difficulty	4

11. Retention	2
12. Problem	2
13. Usefulness	2
14. Stress	2
15. I feel nothing	5
Empty	7

According to Table 1 "Need for explicating"," Happiness", "Interest" and "Comparing" comes into prominence. Seven pre-service class teacher doesn't answer this question.

In large part of pre-service class teachers (49) feels easiness about graphs. Some answers of pre-service class teachers about all categories are below. The numbers in the paranthesis show the examples of categories.

Easiness(1)

"I feel that I can get information easily about situation" (1)
"Because of appeal to the eye understanding will be easier" (1,4)
"I feel happy because they provide convenience" (1,3)
"Solving graph problems is easy for me. Expression is difficult but after learning it makes life easier" (1)
"I think that I can understand and learn the subject easier" (1)
"I feel happy for learning the lesson easier" (1,3)

Need for explicating (2)

"I need for explicating" (2)
"I think that I have to make interpretation" (2)
"First I look at the graphs subject and explicate according to that" (2)
"I need for explicating and inference" (2)
"I feel that I can explicate" (2)

Happiness (3)

"*I feel happy because I can understand better" (*3)
"I feel good because it ease learning" (3,1)
"I feel happy because instead of reading a long text I can learn better with looking a graph" (3,1)
" feel happy because I think that three questions are in my pockets in a maths exam" (3)
"I feel happy because I like graphs" (3)
"I like if it is about geography" (3)
"I will be happy because I can get more information in a short time." (3,1)
"I feel happy because I think I know reading graphs so I can solve the problem." (3)
"I feel good." (3)

Interest (4)

"*If it is prepared in accordance to my interests I pay attention more" (4).*
"My interest to the subject will increase" (4)
"It arouse my interest because it is visual" (4)
"Attracts my attention if it is prepared according to my interests" (4)
"I get excited, it attracts my attention" (4)
"If it is coloured attracts my attention" (4)

Comparing (5)

"*Comparing comes to mind." (5)*
"I think which concept, event will be compared" (5)
"It enables to compare subject better." (5)
"It better to compare something with graphs. With visuality retention will increase. (5,11)
"I think comparing datas more than one, and need explicating with these datas" (5,2)

Anxious and worry(6)

"I feel anxious because I always think that graphs are difficult for example in the exams I don't solve the graphs problems.I think that they are too difficult so I don't read them (6)
I feel worry when I see graphs in maths lesson. But the graphs in geography lesson are easy for me. (6,9,1)
"I am not enough in reading graphs. I begin to worry when I see graphs" (6)
"I feel anxious when I see graphs in maths lessons" (6)

Enjoment (7)
"*I think graphs are an enjoyable subject. Solving graphs problems is very easy for me. Although it is difficult to teach it makes our life easier." (7,9,1)*
"I think I can understand better, it isn't boring because visual, and enjoyable" (7,8)
I think graphs are an enjoyable subject. Solving graphs problems is very easy for me. Although it is difficult to teach it makes our life easier." (7,10,1)
"It relieves me because I know that the subject will be easier." (1,7,10)
Comfort *(8)*
"I feel relax because I can make explication with looking the graph" (8).
"It makes me relax because I can learn the subject better." (8,1)
"It relieves me because I know that the subject will be easier." (1,8,10)
"I think I can understand better, it isn't boring because visual, and enjoyable" (8,7)
Curiosity (9)
"*Develop a great interest in and I need to examine it" (9)*
Difficulty (10)
I feel worry when I see graphs in maths lesson. But the graphs in geography lesson are easy for me. (6,10,1)
Retention (11)
"*It better to compare something with graphs. With visuality retention will increase. (5,11)*
Problem (12)
"I think mathmetics problems" (12)
Usefulness (13)
"It enables to see all the datas in the same time. Because of visuality it helps to retention learning."(1,13)
"Without saving time you can read all the knowledge" (13)
Stres (14)
"I will be stressed. It is too difficult for me to read and explain graphs. I think graphs are difficult for everyone. (14)
I feel nothing (15)
" I feel nothing" (15)"
"I feel not much anyting" (15)

4. Results and Discussion

It can be concluded that most of the pre-service class teachers feel that when they face with a graph their undestanding and interpreting ability will increase. Most of them stated the necesssity of interpreting the graph when they face with. Some of the pre-service class teachers stated that the graphs take their attention. Results showed that using graphs helps understanding, which makes the pre-service teachers feel happy and relaxed. Sometimes, the first sigth of a graph may cause some negative feelings, such as anxious, worry, difficult and stress. The reason of these feeling may be difficulty of undertanding and interpretting of the some graphs. Additionally, graphs being related with the mathematics may cause anxious and stress to increase. The people having this kinds of feelings towards the graphs related with mathematics stated other people share the same feeling in order to show that their feelings are normal. Only very few pre-service class teachers stated that they do not feel anything to be faced with a graph. In our previous study (Aladağ & Sahinkaya, 2013), pre-service class teachers are asked how can social sciences and mathematics be connected. They generally stated that some geography subjects such as population distribution, agricultural areas, distribution of plants over the country, development of provinces can be connected with the mathematics subjects. In the present study, it is interesting to observe that pre-service class teachers gave examples from geopraphy and mathematics, which is also constistent with our previous study (Aladağ & Sahinkaya, 2013). Actually, our main purpose is to prepare an attitude instrument. For this purpose, as a first step, in this study we have determined the feelings, which may be used as an indicators to determine the attitudes of the pre-service teachers towards the graphs.

There are several studies in the literature about developing instruments on statistics and graphs (Dauphinee, Schau ve Stevens, 1997; Mumba et.al., 2009; Szyjka et.al .,2011). Dauphinee, Schau and Stevens (1997) had developed an attitude instrument towards statistics, which had four –factor structure composed of affect,cognitive competence, value and difficulty. Mumba et.al (2009) had developed an attitude instrument towards graphs for pre-service teachers. Their instrument had statements on the six attitude aspects: effort, value, cognitive competence, affect, difficulty and interest. Another study (Szyjka et.al .,2011) was related with questionnaire of attitude toward statistical graph for use in science education and it was four-factor structure composed of confidence, enjoyment, usefulness and learning preferences. Our study has some similarity with these studies in terms of feelings and the attitudes factors.

5. Conclusion

This study give the results of our first step findings on developping an attitude instrument. In this first step, we had seached the feelings of the pre-service teachers about graph, which will help to establish an attitude instrument about graphs in the next step. This instrument will provide the determining of Turkish pre-service class-teachers' attitudes towards graphs. It would be useful for teacher educators to determine their attitudes and consider the developing of new strategies that will foster pre-service class teachers' positive attitude towards graphs. Future research should investigate the relationship between pre-service teachers' attitudes towards graphs and mathematics achievement or self-efficacy beliefs on teaching mathematics or other courses. The graphing preference of pre-service teachers may be related with their attitudes and the mathematics achievement on graphs.

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